

CLAIMS:

1. A method for the production of an arachidonic acid-containing oil, said oil further comprising no more than one fifth as much eicosapentaenoic acid as arachidonic acid,
5 comprising:

(a) cultivating *Pythium insidiosum* in a culture medium containing a carbon source and a nitrogen source, with air sparging and agitation of the culture medium, to induce said *Pythium insidiosum* to produce an oil containing arachidonic acid and no more than one fifth as much eicosapentaenoic acid as arachidonic acid;

10 (b) harvesting said *Pythium insidiosum*;

(c) extracting said oil from said harvested *Pythium insidiosum*; and

(d) recovering said oil.

2. A method in accordance with claim 1, wherein the oil is essentially free of EPA.

15 3. A method in accordance with claim 1 or 2, wherein the oil comprises at least 10% ARA.

4. A method in accordance with claim 3, wherein said oil comprises about 30% ARA.

5. A method in accordance with claim 1 or 2, wherein said ARA is in the form
20 of a triglyceride.

6. A method in accordance with claim 1, wherein said oil comprises at least about 10 parts arachidonic acid per part eicosapentaenoic acid.

7. A method in accordance with claim 1, wherein the dissolved oxygen level in the culture medium is maintained at no less than 10% of the air saturation value of the medium throughout the cultivation.

8. A method in accordance with claim 1 wherein the carbon source is initially provided at a concentration of about 10 to about 100 g/L of medium and the nitrogen source is provided at a concentration of from about 2 to about 15 g/L of medium.

9. An oil comprising ARA and no more than one fifth as much EPA as ARA produced by the method of claim 1.

10. An oil in accordance with claim 9 which comprises at least 10% ARA and is essentially free of EPA.

11. An oil in accordance with claim 9 which comprises about 30% ARA.

12. An oil in accordance with claim 11 which is essentially free of EPA.

13. An oil in accordance with claim 9, wherein ARA is in the form of a triglyceride.

14. A method for the production of an arachidonic acid-containing oil, said oil containing triglycerides wherein at least 25% of the fatty acid residues are ARA, and the amount of EPA residues in the oil is no more than one-fifth the amount of ARA residues, comprising

(a) cultivating *Mortierella* sp. in an aerated fermentor containing culture medium having a carbon source in an amount equivalent to at least 80 g/L glucose and a nitrogen source in an amount equivalent to at least 15 g/L yeast extract;

(b) maintaining the pH between 5 and 6 at the beginning of the cultivation;

(c) maintaining the pH between 7 and 7.5 at the end of the cultivation;

(d) harvesting biomass from the fermentor and recovering said arachidonic acid-containing oil from said biomass.

15. The method of claim 14, wherein the dissolved oxygen level in the culture medium is at least 35% of the air saturation level.

5 16. The method of claim 14 or 15 wherein the *Mortierella sp.* is *M. alpina*.

17. The method according to either claim 1 or claim 14, further wherein crude arachidonic acid-containing oil is recovered from the biomass by extraction with a non-polar solvent and the crude oil is clarified by extraction with a polar organic solvent.

10 18. The method of claim 17, wherein the non-polar solvent is hexane, and the polar solvent is selected from the group consisting of acetone, ethanol and isopropyl alcohol.

a 19. An ~~unmodified~~ fungal triglyceride oil comprising at least about ^{30%} ~~10%~~ ARA in the triglyceride and no more than one tenth as much EPA as ARA.

a 20. An ~~unmodified~~ fungal triglyceride oil comprising at least ³⁰ ~~10~~% ARA in the triglyceride and essentially no EPA.

a 15 21. The ~~unmodified~~ ⁴⁰ ~~unmodified~~ fungal triglyceride oil of claim 19 or 20 wherein the oil contains at least ³⁰ ~~10~~% ARA.

a 22. An oil in accordance with claim 19, ^{or} ~~20, or 21~~, wherein the fungus is *Mortierella sp.*

23. The oil of claim 22, wherein the fungus is *M. alpina*.

20 24. A method of providing triglyceride containing ARA to an infant formula which comprises adding an ~~unmodified~~ ^{Sub B3} ~~unmodified~~ fungal oil comprising at least 10% ARA in the form of triglyceride and comprising no more than one fifth as much EPA as ARA to an infant

formula in an amount sufficient to provide an ARA content which corresponds to the amount of ARA in human breast milk.

25. A method in accordance with claim 24, wherein said oil is produced by a species of *Mortierella*.

5 26. A method in accordance with claim 25, wherein said oil is produced by *Mortierella alpina*.

27. A method in accordance with claim 24, wherein said oil comprises no more than one tenth as much EPA as ARA.

10 28. A method in accordance with claim 24, wherein said oil comprises essentially no EPA.

29. A method in accordance ~~with~~ claim 24, wherein said oil comprises 30% ARA.

Sub B4
a ~~29~~ 30. Infant formula comprising triglyceride containing ARA in an amount comparable to the amount in human breast milk wherein the ARA is provided by adding to infant formula a sufficient amount of an ~~unmodified~~ fungal oil comprising triglyceride
15 containing at least 10% ARA and no more than one fifth as much EPA as ARA.

a ~~30~~ 31. Infant formula in accordance with claim ~~30~~²⁹, wherein the ~~unmodified~~ fungal oil comprises no more than one tenth as much EPA as ARA..

a ~~31~~ 32. Infant formula in accordance with claim ~~30~~²⁹, wherein the ~~unmodified~~ fungal oil comprises triglyceride containing at least 30% ARA.

20 ~~31~~ 33. Infant formula in accordance with claim ~~31~~³⁰, wherein said fungal oil is essentially free of EPA.

a Sub B⁶ 34. An ~~unmodified~~ fungal oil according to claim 19, wherein the oil is from *Pythium insidiosum* and comprises at least about 10% ARA and no more than one tenth as much EPA as ARA.

a 5 35. An ~~unmodified~~ fungal oil according to claim 34 comprising at least 10% ARA and essentially no EPA.

34 36. An oil in accordance with claim ³² 34 or ³³ 35, wherein ARA is present as a triglyceride.

a Sub B⁶ 10 37. A method of providing ARA to an infant formula which comprises adding an ~~unmodified~~ fungal oil from *Pythium insidiosum* comprising at least 10% ARA and comprising no more than one fifth as much EPA as ARA to an infant formula in an amount sufficient to provide an ARA content which corresponds to the amount of ARA in human breast milk.

36 38. A method in accordance with claim ³⁵ 37, wherein said oil comprises no more than one tenth as much EPA as ARA.

15 37 39. A method in accordance with claim ³⁵ 37, wherein said oil comprises essentially no EPA.

38 40. A method in accordance with claim ³⁵ 37, wherein said oil comprises 30% ARA.

a Sub B⁷ 20 41. Infant formula comprising ARA in an amount comparable to the amount in human breast milk wherein the ARA is provided by adding to infant formula a sufficient amount of an ~~unmodified~~ fungal oil from *Pythium insidiosum* comprising at least 10% ARA and no more than one fifth as much EPA as ARA.

a 40 42. Infant formula in accordance with claim ³⁹ 41, wherein the ~~unmodified~~ fungal oil comprises no more than one tenth as much EPA as ARA.

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41 43. Infant formula in accordance with claim 42, wherein said fungal oil is essentially free of EPA.

a 5 Sub B 1
44. A method of providing a human with supplemental arachidonic acid (ARA) comprising administering to a human in need of supplemental ARA a composition containing ~~unmodified~~ fungal oil containing ARA in the form of triglyceride, said oil containing at least 10% ARA and no more than one fifth as much eicosapentaenoic acid (EPA) as ARA, wherein said oil is present in an amount effective to provide supplemental ARA to said human.

45. The method of claim 44, wherein the oil contains at least 30% ARA.

10 43 46. The method of claim 44, wherein said composition is administered enterally.

44 47. The method of claim 44, wherein said composition is administered parenterally.

45 48. The method of claim 44, wherein said composition is administered topically.

46 49. The method of claim 44, wherein said human is a pregnant or nursing woman.

a 15 Sub B 9
50. A cosmetic composition comprising ~~unmodified~~ fungal oil containing ARA in the form of triglyceride, said oil containing at least 10% ARA and no more than one fifth as much eicosapentaenoic acid (EPA) as ARA, wherein said oil is present in said composition in an amount effective to assist in maintaining skin tone when said composition is applied topically.